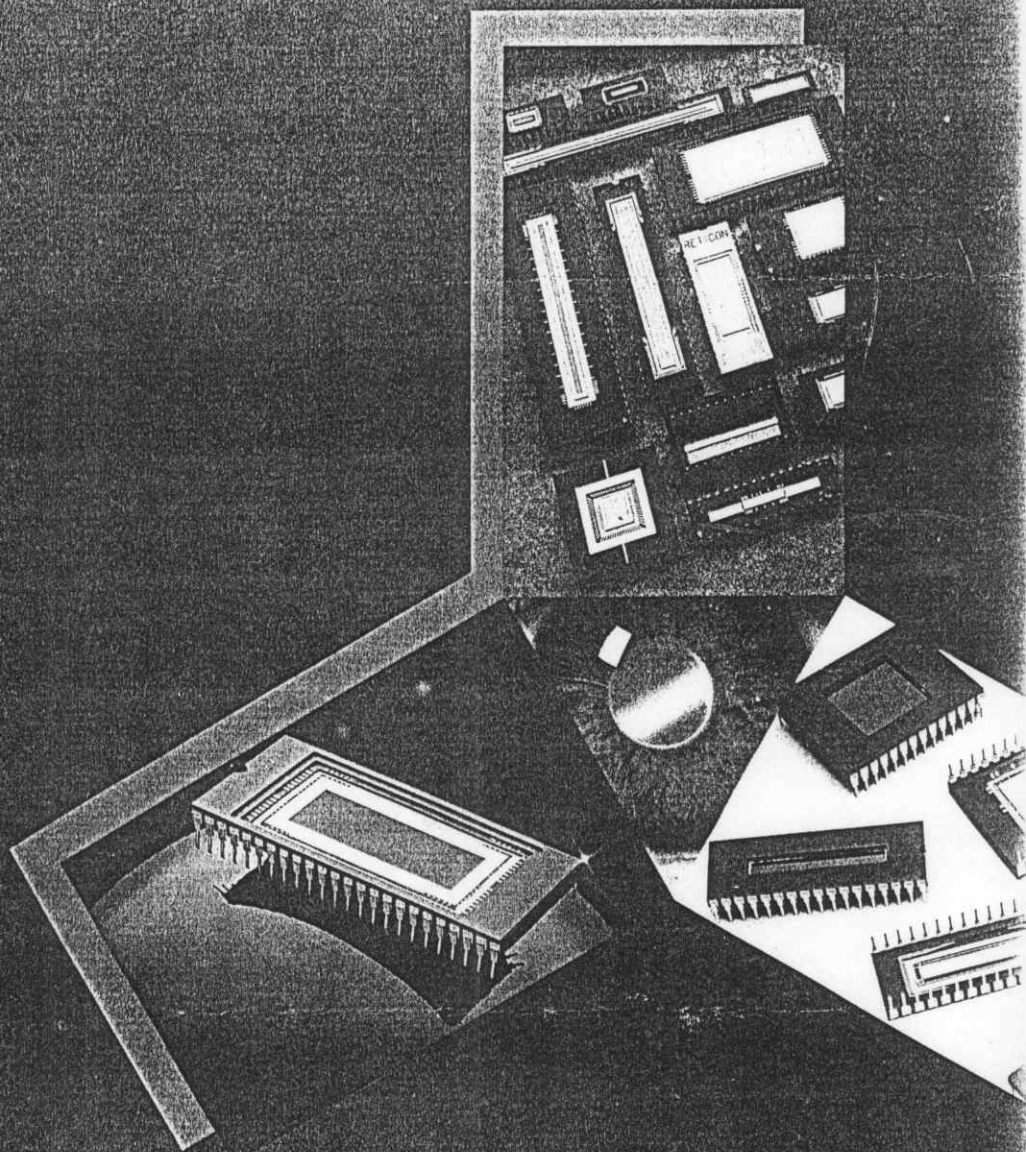


# Image Sensor Products



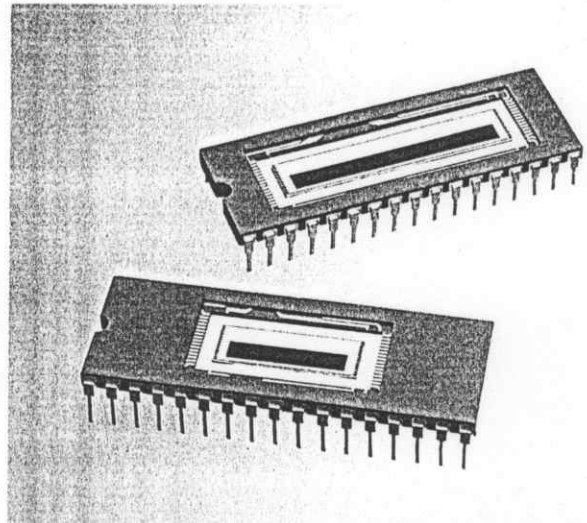
 **EG&G RETICON**  
WHERE VISION AND TECHNOLOGY MEET

## Introduction

EG&G Reticon has been a recognized leader in new and innovative imaging technology for nearly two decades. We have the technology, the reliability, and the experience to provide the image sensing products you need. Reticon's solid state image sensors are fast and tough enough for demanding industrial and military uses, and have the precision and sensitivity required for scientific applications. And, our team of imaging experts has the know-how to help guarantee your success. That's why Reticon has more types of image sensors, in more different applications, than any other manufacturer.

Reticon has the most diverse line of image sensors in the industry. Area scan devices are available with resolutions up to  $400v \times 1200h$  pixels. Special high speed devices can exceed 20,000 frames per second. Line scan devices are available with resolutions from 64 to 4096 pixels and data rates from 1 MHz to 240 MHz. Our Time Delay Integration device uniquely combines area and line scan technology to produce effective sensitivity of  $.004 \mu J/cm^2$  and an effective data rate of up to 128 MHz!!

Reticon, a subsidiary of EG&G since 1976, combines a tradition of innovation and quality with the stability and resources of EG&G, a Fortune 300 company involved in diversified high technology areas serving the instruments, components, biomedical and energy sectors. EG&G Reticon has world wide sales, distribution and support facilities. For more information, contact your nearest EG&G Solid State Products Group sales office.



## Image Sensing Applications

### Character Scan Devices

Reticon's character scan devices are small area and linear arrays engineered for speed, accuracy and reliability. Area arrays are available in  $14 \times 41$ ,  $16 \times 62$ , and  $38 \times 12$  pixel resolutions. These small, rugged devices are ideal for hand-held point of purchase scanners and other systems requiring very high frame rates and maximum dependability. The  $14 \times 41$  and  $16 \times 62$  arrays feature multiple parallel video outputs for maximum frame rates. The  $38 \times 12$  array has a single serial video output for simplified operation. Linear arrays with 128 and 256 pixel resolution are also ideal for character scan applications.

### Instrumentation Devices

Reticon's instrumentation devices include a broad range of linear and area arrays with architectures and performance characteristics which allow the system designer to select just the right sensor for a particular application. These devices are ideally suited for use in industrial, scientific, and military instrumentation such as electronic cameras; PC board inspection systems; food inspection and sorting systems; optical gauging, inspection, and measurement equipment; document scanners; IC mask alignment equipment; robot guidance; target acquisition and tracking systems; laser profiling, alignment, and test systems.

Line scan arrays have resolutions from 128 to 4096 elements and pixel apertures from  $13\mu$  to  $300\mu$  so that just the right combination of resolution and sensitivity can be selected. The G Series are general purpose, easy to use devices which operate at data rates up



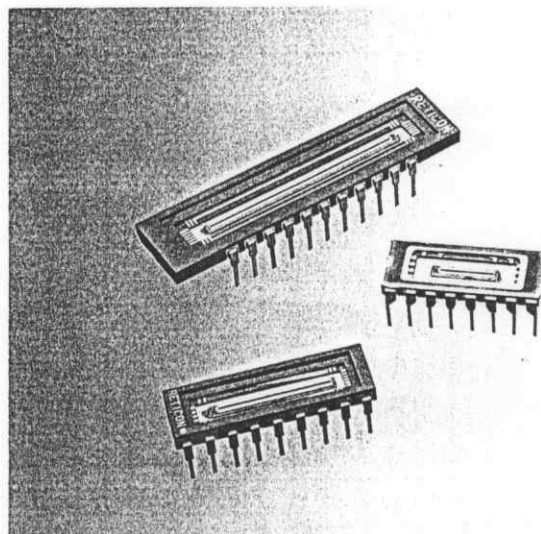
Type	Appl.	Image Sensor Series	Number of Elements		Element Spacing ( $\mu\text{m}$ )	Aperture/Row Spacing ( $\mu\text{m}$ )	Dynamic Range (rms)	Max. Data Rate (MHz)	Saturation Exp. ( $\mu\text{J}/\text{cm}^2$ )	Saturation Charge (pC)	
Area	Inst	RA0100A	100 x 100	60	60	500:1	10	.16	1.5		High frame rate, select
Area	Inst	RA0128N	128 x 128	60	60	500:1	10	.16	1.5		High frame rate, select
Area	Inst	RA0256B	256 x 256	40	40	500:1	5	.4	.8		High frame rate, select
Area	Char	RA1441A	14 x 41	104	91	n/s	.2	.07	n/a		High frame rates (>450)
Area	Char	RA1662N	16 x 62	100	100	n/s	.4	.3	n/a		High frame rates (>620)
Area	Inst	RA2568	256 x 256	40	40	300:1	40	.37	.8		High frame rates (>500)
Area	Char	RA3812	38 x 12	102	102	n/s	4	.18	1.6		Single video output, hig
Area	Inst	RA6464	64 x 64	100	100	100:1	.78	.05	2		Very high frame rates (
Area	Spec	RA1200J	1200 x 400	27	27	140,000:1	3		.08		Very low dark current,
TDI	Inst	RA2048J	2048 x 64	27	27	5500:1	128	.0043	.1		TDI mode CCD, extren
Line	Inst	D Series	256,512,1024,2048	13	13	13000:1	20	.47	n/s		CCPD structure, antibl
Line	Inst	D Series Tapped	256, 512, 1024	18	18	7500:1	240	.45	n/s		CCPD structure, multip
Line	Inst	G Series	128,256,512,1024	25	25	300:1	1	1.8	4		Easy to use, single pha
Line	Inst	H Series	1024,1728,2048	15	16/300	3000:1	3	3.0/2	2.2		High resolution, wide a
Line	Spec	K Series	128,256,512,1024	25	250	1000:1	1	.18	4		High sensitivity, wide s
Line	Spec	R Series	512, 1024	25	2500	100,000:1	5	.05	14		Dual S Series on a sin
Line	Spec	S Series	128,256,512,1024	25	2500	100,000:1	5	.05	14		Low dark current, very
Line	Spec	S Series	2048	25	2500	100,000:1	10	.05	14		Same as S, has 4 read
Line	Spec	SAX Series	128, 512, 1024	25	2500	100,000:1	5	5.6	14		Fiber optic face plate v
Line	Spec	SB Series	128,256,512,1024	25	2500	60,000:1	10	.035	10		Same as S, plus antibl
Line	Spec	SR Series	512, 1024	25	2500	60,000:1	1	.04	10		Random photodiode ac
Line	Spec	T Series	64,128,256,512	50	2500	175,000:1	2.5	.05	28		Low dark current, wide
Line	Spec	TB Series	64,128,256,512	50	2500	110,000:1	10	.034	19		Same as T, plus antibl
Line	IR	SI Series	512, 1024	25	2500	5000:1	1	n/a	10		PtSi linear array, 1 $\mu\text{m}$
Line	IR	NI Series	128 x 128	60	60	1000:1	10	n/a	n/a		PtSi area array, 1 $\mu\text{m}$ to
Line	Mux	M Series Linear	32,64,128,256	n/a	n/a	n/a	7	n/a	n/a		Parallel in/serial out m
Area	Mux	M Series Area	128 x 128, 256 x 256	60	n/a	n/a	10	n/a	n/a		Area mux, sensing arr

Specifications are subject to change without notice.

n/a - not applicable n/s - not specified

## Features

v readout, frame and line reset, square pixels, low dark current
v readout, frame and line reset, square pixels, low dark current
v readout, frame and line reset, square pixels, low dark current
parallel outputs, single phase TTL clock, small size
parallel video outputs, single phase clock, small size
allel outputs, frame reset, square pixels
rate (>7500), small size
), 16 parallel video outputs, high sensitivity
ly low noise, MPP operation, square pixels
itivity, 16 parallel outputs, bi-directional vertical readout
line reset, wide spectral range, low-noise
outputs, antiblooming, line reset, wide spectral range
level clock, differential video output
, end of scan output, differential video output
range, single phase TTL clock, differential video output
. perfect registration
nsitivity, low noise, wide spectral range, low power
sters and 4 video lines for 2X faster readout
ay sensitive phosphor
line reset, very low dark current, low pwr, temp. diode
ne reset, low power, low noise
l range, low noise, low power
line reset, very low dark current, low pwr, temp. diode
n spectral range
spectral range
rip bonding pads, low power, diode reset
ned over the top.



to 1 MHz using only a single phase TTL level clock input. The D Series are charge coupled photodiode (CCPD) devices which combine the best characteristics of both photodiode and CCD devices to give exceptional performance. In addition, they have antiblooming, exposure control and extended spectral response. Video data rates from several kilohertz to 240 MHz allow these devices to perform in the widest possible range of applications.

Area scan arrays include devices that operate at much higher frame rates than conventional sensors, yet, because the photo elements have low dark current, they can perform at much lower frame rates as well. Unique sensor architectures provide important features such as full frame reset, selective row readout, and parallel data readout. Devices are available with  $64^2$ ,  $100^2$ ,  $128^2$ , and  $256^2$  pixel resolutions and are perfect for high speed applications such as industrial inspection, target acquisition and tracking, and medical imaging.

A new Time Delay Integration (TDI) device allows both very high speed and very low light level operation. The array has 2048 vertical columns of 64 pixels each, which allow data to be shifted in either vertical direction. When the vertical shift is synchronized with image motion, the effective integration time is multiplied by 64, producing 64 times more output than that of a single integration period, with greatly reduced noise. This sensitivity increase reduces the need for expensive, high powered lighting. Sixteen parallel output registers allow the video data to be read out at an incredible 128 MHz rate. These devices are ideal for high speed applications such as PC board inspection, check reading, and mail sorting.

## Spectroscopy

Spectroscopy sensors are very high performance photodiode and CCD arrays designed to deliver the highest sensitivity with the lowest possible noise over an extended spectral range. They can achieve dynamic ranges nearly two orders of magnitude higher than conventional devices. Analytical instrumentation demands this kind of performance and Reticon delivers it with these arrays.

S and T Series arrays set the pace for solid state UV/VIS spectrometers with sensitivity, dynamic range, and photodiode geometry optimized for spectroscopy applications. SB and TB Series arrays add the advantages of low power operation, very low dark current, antiblooming, and a photodiode reset feature for added versatility.

SR Series arrays feature random photodiode access and pixel by pixel control of integration time making them ideal for microprocessor based systems. Dual Beam spectroscopy applications are served by the R Series arrays which contain two parallel photodiode arrays in perfect registration to eliminate the need for costly and tenuous alignment.

The RA1200J is a unique high resolution, full frame, CCD area imager. Extremely low noise, very high dynamic range, and large signal handling capability make it perfect for scientific and astronomy applications. It can be operated in the dark current reducing MPP mode for greatly enhanced performance when long integration times are required.

## Infrared Sensors and Multiplexers

EG&G Reticon is leading the way in commercial infrared applications with Platinum Silicide IR sensors. PtSi arrays utilize Schottky Barrier PtSi technology to deliver peak performance in the 1 to 5.5 micron spectral range.

The SI Series linear PtSi arrays are an IR extension of our popular SB Series arrays. They are available with 512 and 1024 elements and operate from standard +5V power supplies. The RA0128NI is a 128 x 128 PtSi focal plane array for industrial temperature monitoring, target tracking, missile seekers, and other demanding IR applications. Both the linear and area PtSi arrays are available with liquid nitrogen dewars which contain the necessary electronics for readout.

M Series multiplexers are general purpose scanners for hybrid IR imaging applications. Infrared arrays using semiconductor compounds such as InSb, HgCdTe, etc., can be mated to the M Series multiplexers for readout. Linear M Series with 32, 64, 128 and 256 elements and Area M Series with 128 x 128, 256 x 256 elements are available.

## Image Sensing Choices

### Windows and Packages

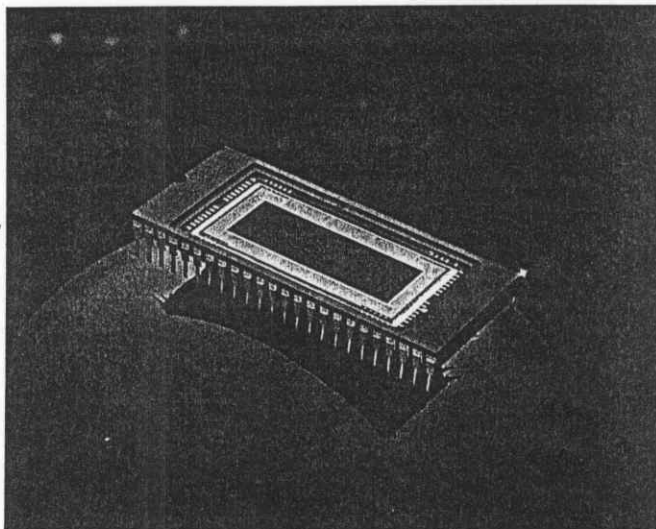
EG&G Reticon's image sensors are normally supplied in high quality side-brazed ceramic dual-inline packages with glass or quartz windows. Many of the devices are available with a fiber optic faceplate to allow easy coupling to specialized instrumentation. A variety of other packages and window materials are available to meet your special packaging or window requirements.

### Evaluation Boards

Evaluation boards are available for most of our arrays, to reduce your engineering development time and costs. These boards provide all the signals necessary to efficiently operate the devices so that you can concentrate on the application.

### Custom Arrays

EG&G Reticon will design and build special image sensors custom tailored to your requirements. Our broad experience in CCD, CCPD, MOS, and PtSi technologies allows us to produce unique designs to meet your specific image sensing requirements. Special packaging, testing, or screening is also available.

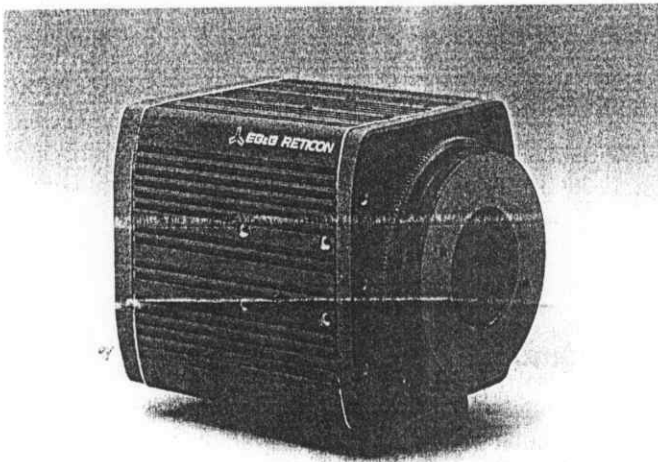




## **Other EG&G Reticon Standard Products**

**Solid State Camera Products.** Cameras and support hardware, including camera microcomputer interfaces, controllers, light sources and optics, for use in robotics, industrial process control and noncontact measurement tasks. Reticon camera products have been used for quality assurance, sorting, process control, material handling, robot guidance, test and calibration, machine monitoring and safety.

**Signal Processing Products.** Switched-capacitor filters to perform all classical filter functions, i.e., high-pass, low-pass, bandpass, notch. Modern filters for Bell and C.C.I.T.T. requirements. Analog/Digital signal processing products to perform signal processing functions. Delay lines for audio sound requirements.



### **Corporate Headquarters**

345 Potrero Avenue  
Sunnyvale, California 94086-4197  
(408) 738-4266  
FAX: (408) 738-6979

### **Direct Sales**

#### **Western Regional Sales Office**

345 Potrero Avenue  
Sunnyvale, CA 94086-4197  
(408) 245-2060  
FAX: (408) 738-6979

#### **Eastern Regional Sales Office**

35 Congress Street  
Salem, MA 01970-6529  
(508) 745-7400  
FAX: (508) 741-4583

#### **Mid-Atlantic Sales Office**

221 Commerce Drive  
Montgomeryville, PA 18936  
(215) 368-4003  
FAX: (215) 362-6107

#### **Central Regional Sales Office**

2260 Landmeier Road, Suite J  
Elk Grove Village, IL 60007-2693  
(708) 640-7785  
FAX: (708) 364-7079

#### **Southern California Sales Office**

23832 Rockfield Blvd., Suite 235  
El Toro, CA 92630-2896  
(714) 583-2250  
FAX: (714) 583-2277

#### **United Kingdom Sales Office**

34/35 Market Place  
Wokingham  
Berkshire RG11 1AT  
England  
Tel: (0734) 788666  
FAX: (0734) 774561

#### **European Sales Office**

Hohenlindener Str. 12  
8000, Munich 80  
West Germany  
Tel: (089) 92692-666  
FAX: (089) 436 25 45

 **EG&G RETICON**